

Name: _____

Math 10F & 10C H.

Date: _____

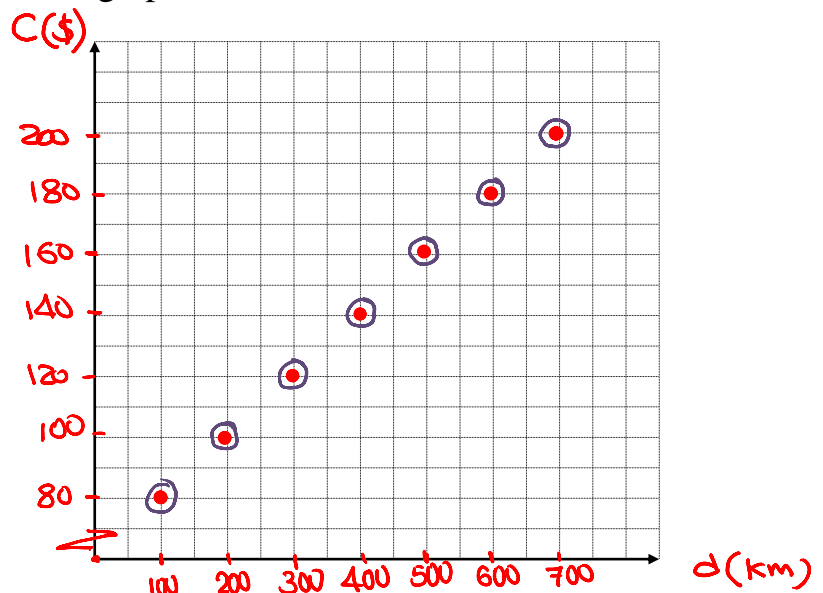
Chapter Ch.5 Relations and Functions

5.6 - Properties of Linear Functions**Focus:** Identify and represent linear relations in different ways.**Independent variable:** “x” value – Does not depend on anything (can stand alone) – you have no control over it. Eg. Time, number of people**Dependent variable:** “y” value – Depends on the independent variable (cannot stand alone) changes according to the independent. Eg. Cost, total wages.**Example 1:** The cost for a car rental is \$60, plus \$20 for every 100km driven.Independent Variable = distance^(d) (km) Dependent Variable = Cost^(C) (\$)

Write this linear relation as a table and a graph:

$$\text{Cost} = 60 + 0.2d$$

Distance (km)	Cost (\$)
100	80
200	100
300	120
400	140
500	160
600	180

Rate of change: \$ 20 / 100 kms \$0.2/km

$$C = 0.2d + 60$$

Example 2: Which table of values represents a linear relation?

- a) The relation between temperature in degrees Celsius, c, and temperature in degrees Fahrenheit, F.

C	F
0	32
5	41
10	50
15	59
20	68

yes, It is a linear relation since the change of both variables is constant

- b) The relationship between the current, I amps, and power, P watts, in an electrical circuit

I	P
0	0
5	75
10	300
15	675
20	1200

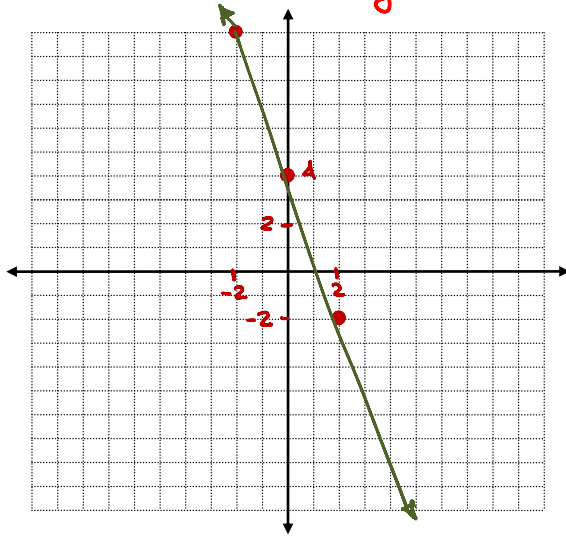
No, It is not a linear relation because the change of (P) is not constant.

$$y = mx + b \quad \xrightarrow{\quad} \quad f(x) = mx + b$$

Example 3: Graph each equation and explain which one is linear relation?

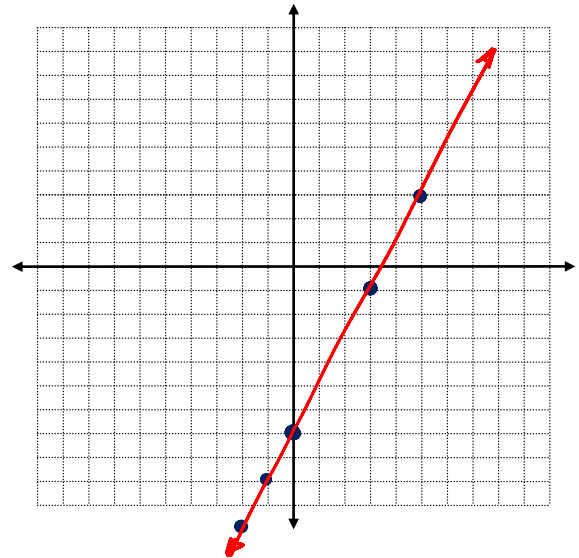
a) $y = -3x + 4$

negative slope



b) $y = 2x - 7$

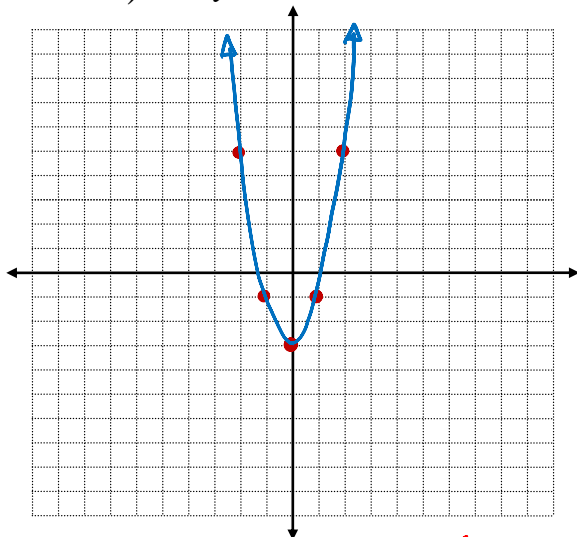
positive slope.



c) $y = 2x^2 - 3$

Not a linear

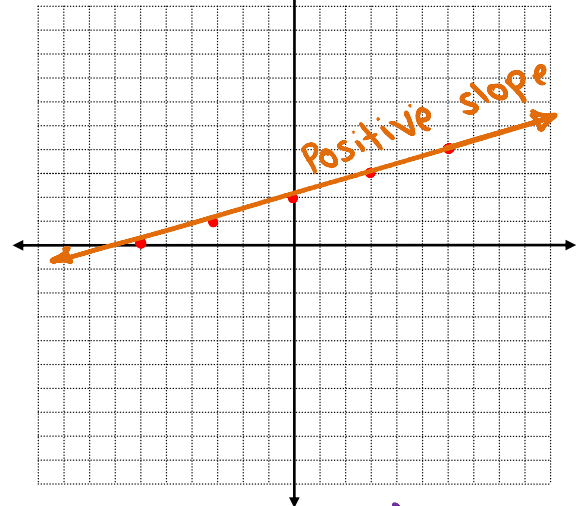
$x = -3$
 $x = -2$
 $x = -1$
 $x = 0$
 $x = +1$
 $x = +2$
 $x = +3$



$D: \{x \mid x \in \mathbb{R}\} - (-\infty, \infty)$
 $R: \{y \mid y \geq -3\} - [-3, \infty)$

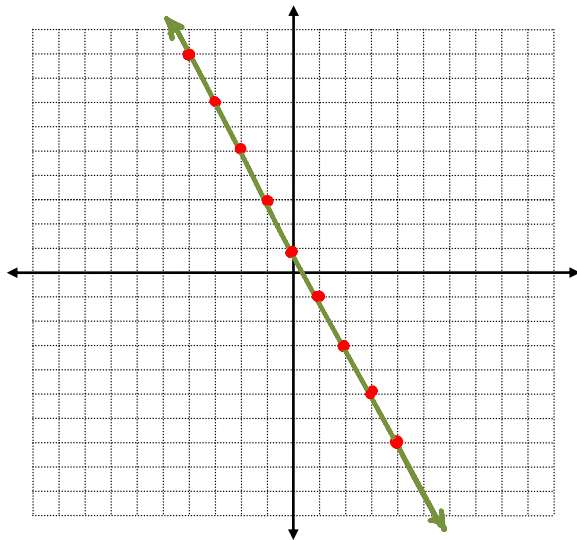
d) $y = \frac{1}{3}x + 2$

positive slope

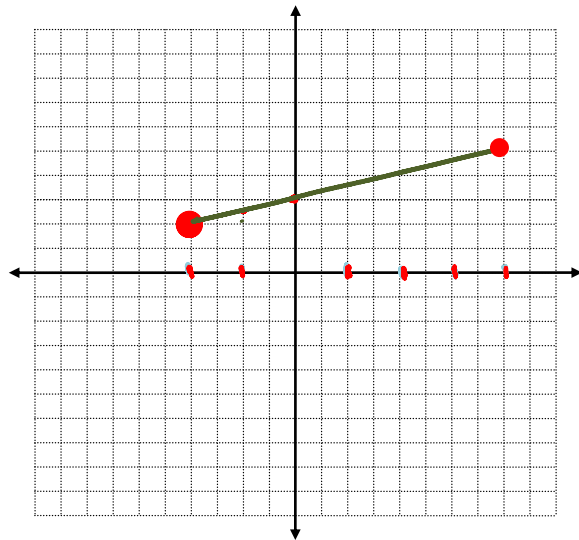


$D: \{x \mid x \in \mathbb{R}\} - (-\infty, \infty)$
 $R: \{y \mid y \in \mathbb{R}\} - (-\infty, \infty)$

e) $y = 1 - 2x$



f) $y = \frac{1}{2}x + 3; -2 \leq x \leq 4$



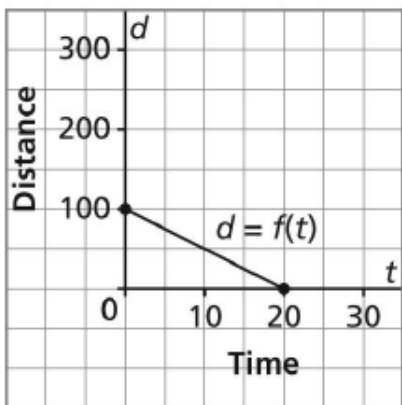
$D: \{x \mid -2 \leq x \leq 4, x \in \mathbb{R}\} - [-2, 4]$
 $R: \{y \mid 2 \leq y \leq 5, y \in \mathbb{R}\} - [2, 5]$

Example 4: Equation of a line $y = mx + b$

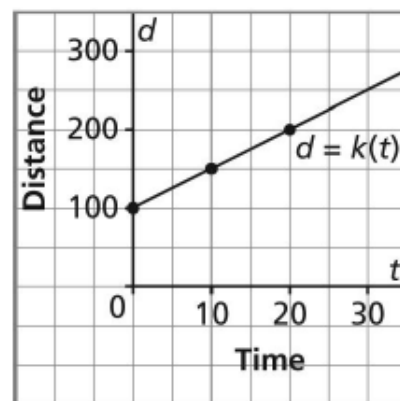
- y = the dependent variable
- m = rate of change (slope) \leftarrow
- x = the independent variable
- b = the initial amount (y intercept)

$y = mx + b$

Rate of change can be positive or negative



Negative rate
of change



Positive rate
of change

Example 5: Sketch a graph of Graph: $5x + 3y = 12$ (table of values)

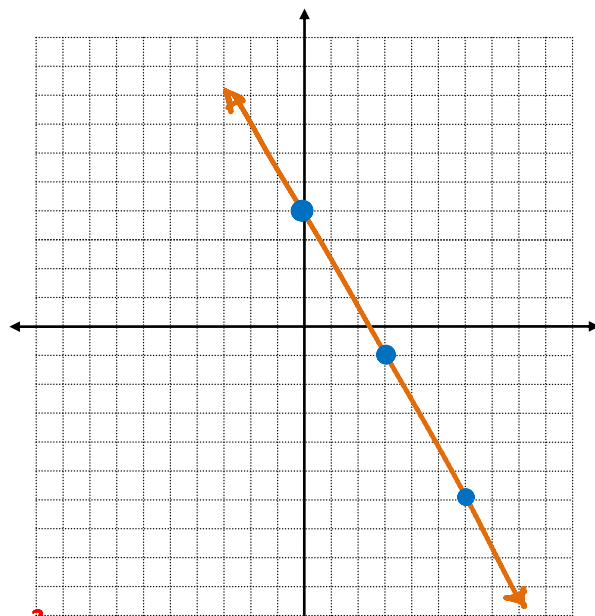
- What is the rate of change? (slope) $m = \frac{-5}{3}$
- What is the x – intercept (where it crosses the x axis)? $x_{\text{int.}}$ when $y=0$ *
- What is the y – intercept (where it crosses the y axis)? $y_{\text{int.}}$ when $x=0$ *
- Determine the coordinates of a third point on the graph. When $x = 1$
- What is the Domain?
- What is the Range?

$5x + 3y = 12$
change it to $y = mx + b$

$$\frac{3y}{3} = \frac{-5x + 12}{3}$$

$$y = \frac{-5}{3}x + 4$$

$$y = mx + b$$



a) rate $= \frac{-5}{3}$

b) $x_{\text{int.}}$ when $y=0$

c) y_{int} when $x=0$

$y = 4$

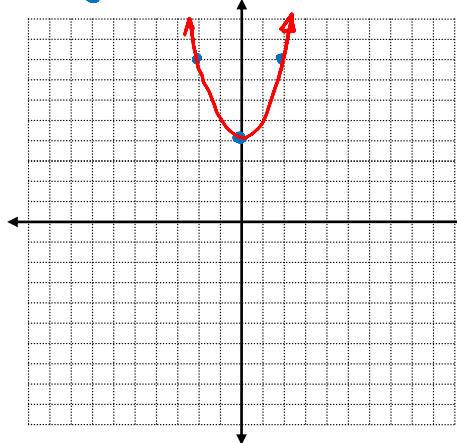
$0 = \frac{-5}{3}x + 4$
 $\frac{3}{5} \times \frac{5}{3}x = 4 \times \frac{3}{5}$
 $x_{\text{int}} = \frac{12}{5}$

$D: \{x | x \in \mathbb{R}\}$ $(-\infty, \infty)$
 $R: \{y | y \in \mathbb{R}\}$ $(-\infty, \infty)$

Try: Draw a graph of the equation:

i) $-2x^2 + y = 8$

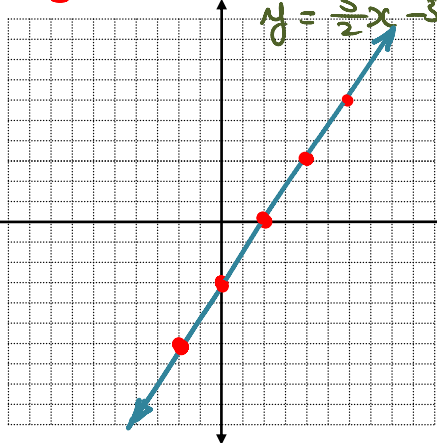
$y = 2x^2 + 8$



ii) $3x - 2y = 6$

$\frac{-2y}{-2} = \frac{-3x + 6}{-2}$

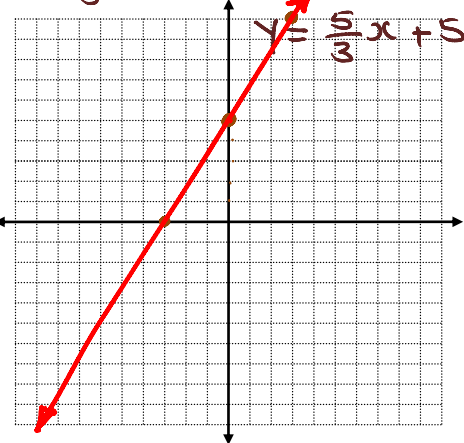
$y = \frac{3}{2}x - 3$



iii) $5x - 3y = -15$

$\frac{-3y}{-3} = \frac{-5x - 15}{-3}$

$y = \frac{5}{3}x + 5$



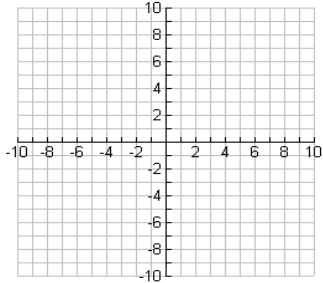
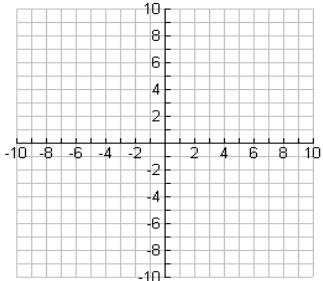
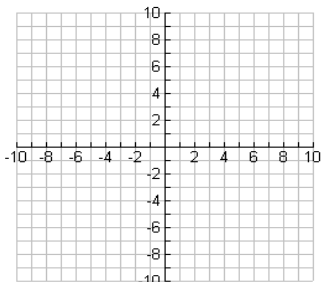
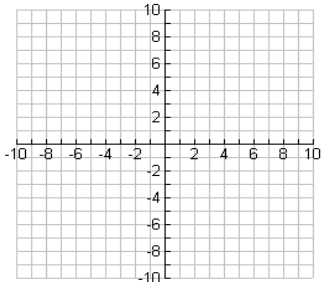
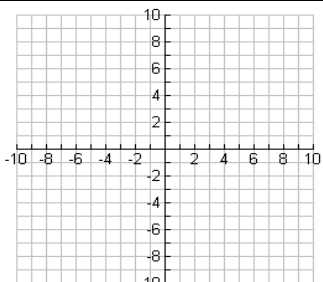
Assignment: p. 308 Q #3ac, 4ac, 6, 7, 12, 15, 16

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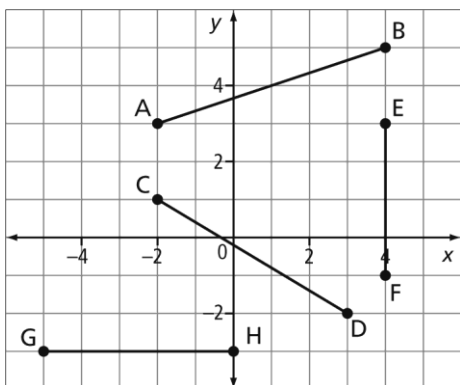
Math 10F & PC H.

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Chapter Ch.5 Relations and Functions**Graphing Using $y = mx + b$** **Problem:** State the slope and the y-intercept for each line using the equation. Graph the line using the slope and a point method (use the slope and the y-intercept).

<i>Equation</i>	<i>slope</i>	<i>y-intercept</i>	<i>Graph</i>
$y = 2x - 1$			
$y = -3x + 2$			
$y = 0.5x + 1$			
$y = -\frac{2}{3}x + 3$			
$y = \frac{4}{5}x$			

Determine the slope of each line segment and use the data to fill in the blanks below.
(You may use do so graphically or using the formula)

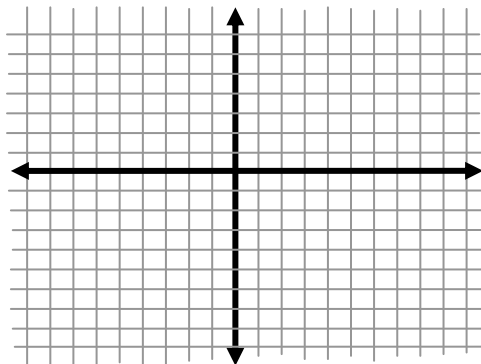


If the slope a line segment is

- positive, then the line segment _____
- negative, then the line segment _____
- zero, then the line segment is _____
- undefined, then the line segment is _____

Graph each line, given a point on the line and its slope.

a) $(4, 5)$, $m = 3$



b) $(-2, 6)$, $m = \frac{1}{2}$

